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**WO 02/27517 A1**

(54) Title: OPEN MESSAGING FOR PORTABLE COMPUTING DEVICES

(57) Abstract: A system for pushing of any type of content to a portable computing device, without requiring subscription to a particular Internet service or plan. A messaging repository receives from a source content that is intended for a recipient. The repository assigns an Internet address to the content, stores the content on a server at that address, and sends the Internet address to the recipient's portable computing device (PCD). The PCD receives the Internet address via its communication device, which checks to see if the PCD is in a reduced-power mode. If so, the communication device initiates a wake-up sequence, and then launches third party application software to connect to the Internet and resolve the address. Once the address has been resolved, the recipient is alerted to the received content, with which the recipient may at that time interact. This interaction is well suited for online auctions, group-buying, sales force management, surveys, and voting. In an alternative embodiment, the repository receives only the Internet address, which it then forwards to the recipient in the same manner.

## OPEN MESSAGING FOR PORTABLE COMPUTING DEVICES

### FIELD OF THE INVENTION

5           The present invention relates to software-based alerting and interactive messaging involving portable computing devices.

### BACKGROUND INFORMATION

10           The two messaging devices that have become the most popular in recent years are the pager and the wireless telephone. Both of these devices can do one thing that portable computing devices cannot do: push data without a request originating from the device. For example, a telephone receives a call and rings without involvement from the receiver of the call, and a pager receives a page without involvement from the receiver of the call.

15           Desktop computers have the ability also, with additional software, to have messages and alerts pushed over the Internet to the end user (e.g., e-mail). A problem with using the desktop as the messaging interface is that you can never assume a desktop system is on, or that a user is present to receive a message or alert. People cannot clip their desktop or  
20   laptop computer onto their belt and carry it around.

          Today, the dominant messaging providers sell bundled hardware and software systems. Most of these systems consist of proprietary vendor assembled / manufactured hardware based on standard components (microprocessor, bus, and cards) and operating  
25   systems. None of today's dominant vendors unbundle the software to run on industry standard, commercially available, third party computing platforms. In most cases the vendor requires that the user obtain service directly from them in order to take advantage of the alerting and interaction.

30           Accordingly, there is a need in the art for a method and system for software-based alerting and interactive messaging for portable computing devices on independent platforms.

5 SUMMARY

The present invention provides for the pushing of any type of content to a portable computing device, without requiring subscription to a particular Internet service or plan. A messaging repository receives from a source content that is intended for a recipient. The repository assigns an Internet address to the content, stores the content on a server at that address, and sends the Internet address to the recipient's portable computing device (PCD). The PCD receives the Internet address via its communication device, which checks to see if the PCD is in a reduced-power mode. If so, the communication device initiates a wake-up sequence, and then launches third party application software to connect to the Internet and resolve the address. Once the address has been resolved, the recipient is alerted to the received content, with which the recipient may at that time interact. This interaction is well suited for, e.g., online; auctions, group-buying, sales force management, surveys, and voting. In an alternative embodiment, the repository receives only the Internet address, which it then forwards to the recipient in the same manner.

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BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram depicting a portable computer device in accordance with an example embodiment of the present invention.

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FIG. 2 is a block diagram depicting a network architecture in accordance with an example embodiment of the present invention.

FIG. 3 is a flowchart of steps illustrating the operation of a messaging system in accordance with the example embodiment of FIG. 2.

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FIG. 4 is a block diagram depicting a network architecture in accordance with an example embodiment of the present invention.

FIG 5 is a flowchart of steps illustrating the operation of a messaging system in accordance with the example embodiment of FIG. 4.

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5           FIG. 6 is a block diagram depicting an optional translation layer in messaging repository in accordance with the example embodiment of FIG. 2.

          FIG. 7 is a block diagram depicting a portable computer device in accordance with an example of the present invention.

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          FIG. 7 is a flowchart of steps illustrating the operation of a portable computer device in accordance with the embodiment of FIG. 7.

### DETAILED DESCRIPTION

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          FIG. 1 is a block diagram depicting the internal structure of PCD 100 in accordance with an example embodiment of the present invention. PCD 100 may be a handheld computer, personal digital assistant ("PDA"), pocket computer, or any type of mobile, batter-powered microprocessor-based device. PCD 100 may include processor 110, input device 120, output device 130, storage device 140, and communication device 160. Input device 120 may include a keyboard, mouse, pen-operated touch screen, voice-recognition device, or any other device that provides input from a user. Output device 130 may include a monitor, printer, disk drive, speakers, or any other device that provides tangible output to user. Storage device 140 may include volatile data storage, such as RAM, caches, or any storage medium that temporarily holds data while it is being processed, and nonvolatile data storage, such as a hard drive, CD-ROM drive, tape drive, removable storage disk, or any other non-temporary storage medium. Communication device 160 may include a modem (wire or wireless), pager, network interface card, or any device capable of transmitting and receiving signals over a network. Application software 150 may reside in storage device 140, and may include third party content handling software such as an HTML (Hyper Text Markup Language) browser (e.g., INTERNET EXPLORER (TM), NETSCAPE NAVIGATOR (TM), a clipped HTML browser, a WAP (Wireless Application Protocol) browser, XML (eXtensible Markup Language) browser, a Telnet / VT100 client, and a chat client. One skilled in the art would appreciate that the components of PCD 100 may also be connected wirelessly, possibly through an infrared connection.

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5           FIG. 2 is a block diagram depicting a network architecture that facilitates the pushing of content (e.g., data, message, Web page, etc.) from a remote server system (e.g., legacy system 210) to recipient 260 via messaging repository 200 in accordance with an example embodiment of the present invention.

10           Legacy system 210 is operated by a company and includes legacy server 213 and relational database 217. Legacy server 213 may include a collection of local network server computers working in tandem to distribute the load of network traffic. These network server computers include processors and memory for executing program instructions as well as network interfaces (not shown). Relational database 217 contains content stored by legacy  
15 applications in which the company has invested considerable time and money. The content residing in relational database 217 may contain media types including text, HTML, voice, still or moving images, audio, unknown XML compliant markup languages, and WML (Wireless Markup Language).

20           Legacy system 210 communicates with messaging repository 200 via communication links 225a-d, Internet service providers 220a-b, and computer network 230. Communication links 225 may include, for example, telephone lines, DSL, cable networks, T1 or T3 lines, wireless networks, or any other arrangement that allows for the transmission and reception of network signals. Computer network 230 may include a wide-area network  
25 (WAN), such as the Internet, a local-area network, such as an intranet, a virtual private network (VPN), etc. It should be noted that, technically, PCD 100, legacy server 213, message server 203, communication links 225, Internet service provider serves 220, and any intermediate network components, such as routers (not shown), are also part of computer network 230 because of their connectivity. Computer network 230 may implement any  
30 number of communications protocols, including TCP/IP (Transmission Control Protocol/Internet Protocol), and may be secured by any security protocol, such as SSL (Secure Sockets Layer).

          Message server 203 communicates with PCD 100 via communication links 225e-g,  
35 paging service provider 240, and paging network 250. Message server 203 may also include a collection of local network server computers working in tandem to distribute the load of network traffic (including processors and memory for executing program instructions as

5 well as network interfaces (not shown)). Paging network 250 may include, for example, a collection of rf paging towers 255 run by paging service provider 240, and may further include hardware and software maintained by paging companies to allow users to send and receive pages. In alternative embodiments, messaging repository 200 may communicate with PCD 100 via other means, such as point-to-point cellular communication.

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Recipient 260 is connected to computer network 230 via communication device 160 of PCD 100, communication links 225h-i, and Internet service provider 220c.

FIG. 3 is a flowchart of steps illustrating the operation of a messaging system in accordance with the example embodiment of FIG. 2. According to this embodiment, legacy system 210 is configured to search for an event relating to content in relational database 217 that is of particular interest to recipient 260 (step 300). For example, legacy system 210 may monitor stock quotes, and when a specific stock rises or falls beyond a predefined level (step 310), legacy system 210 pushes the relevant content to recipient 260. This can be accomplished by configuring SQL (Structured Query Language) triggers to fire when predetermined conditions are satisfied with respect to specified data field values.

Upon the capturing of an event based on content, legacy server 213 pushes the relevant content to recipient 260 by sending it to messaging repository 200 via computer network 230 (step 320). Associated with the content is the type of content (e.g., HTML, WAP, FTP, XML, etc.). In alternative embodiments, content may be transmitted to messaging repository 200 via fax machines, paging interfaces (DTMF (Dual Tone Multi-Frequency)), telephone, traditional mail, Internet / TCP/IP / e-mail, and EDL (Electronic Data Interchange). Legacy server 213 sends an identifier along with the content to messaging repository 200, so that messaging repository 200 can forward the content to the correct recipient 260.

Upon reception of the content, message server 203 assigns an Internet address to the content (step 330) and stores the content in relational database 207 at the assigned Internet address (step 340). In doing this, message server 203 functions in the capacity of a web server; in an alternative embodiment, message server 203 may send the information to a separate web server (inside or outside messaging repository 200), which would host the

5 content for later retrieval. It is appreciated that in alternative embodiments, any address may be assigned to store the content. This address may include, among others, an Internet address or an address that maps to an Internet address.

10 Once the content is stored at the assigned Internet address, message server 203 uses the identifier from legacy server 213 to query recipient's 260 profile in relational database 207. This profile contains the delivery parameters necessary to contact recipient's 260 PCD 100, such as a pager number or mobile phone number for the device. According to the example embodiment of the present invention, also included in the profile are all necessary data to support scheduling, re-trying, and escalating all content messages. In this  
15 embodiment, message server 203 retrieves from the profile the pager number for recipient's 260 PCD 100, and sends to PCD 100 a page including the assigned Internet address for the content and the content type (step 350).

Upon receiving the page, PCD 100 launches the appropriate application software  
20 150 for the specified content type, and application software 150 resolves the Internet address received in the page (step 360). PCD 100 connects to its default Internet service provider 220, which may not be affiliated with legacy system 210 or messaging repository 200. Once resolved, recipient 260 is notified of the pushed content, and is able to interact with it (step 370). The content may be an interactive message as in the case of HTML forms, WMO  
25 applications, and other media types that allow recipient 260 to provide input for re-delivery to the original sender of the message. This terminates the process (step 380).

FIG. 4 is a block diagram depicting a network architecture that facilitates the pushing of content (e.g., data, message, Web page, etc.) from senders 410 to recipient 260  
30 via messaging repository 200, in which the content is not sent to messaging repository 200, in accordance with an example embodiment of the present invention.

Web site 400 provides public access to its content, and includes Web server 403 and relational database 407. Web server 403 may include a collection of local network server  
35 computers working in tandem to distribute the load of network traffic. These network server computers include processors and memory for executing program instructions as well as network interfaces (not shown). Relational database 407 contains content in the form of

- 5 Web pages. The content residing in relational database 217 may contain media types including text, HTML, voice, still or moving images, audio, unknown XML compliant markup languages, and WML (Wireless Markup Language).

Web site 400 connects to computer network 230 (e.g., the Internet) via  
10 communication link 225a and Internet service provider 220a. Sender 410a with personal computer 420 (i.e., desktop version of PCD 100) and sender 410b with 410b with PCD 100b connect to computer network 230 via communication link 225j and communication link 225k, respectively, and Internet service provider 220c. The remaining structure is similar to that of FIG. 2.

15

FIG. 5 is a flowchart of steps illustrating the operation of a messaging system in accordance with the example embodiment of FIG. 4. According to this embodiment, senders 410 push content to recipient 260 (step 500) by sending the Internet address of the desired content to messaging repository 200 via computer network 230 (step 510). Upon  
20 reception of the Internet address, message server 203 sends the Internet address to recipient's 260 PCD 100a in the same manner as in step 350. PCD 100a receives the Internet address and launches application software 150 resolve the address in the same manner as in step 360 and recipient 260 interacts with the received content in the same manner as in step 370. The only difference between step 530 and step 360 is that in the  
25 embodiment of FIG. 4 and FIG. 5, the Internet address, and hence the content, is not associated with messaging repository 200 at any time.

These and other embodiments may be applied to, among other things, the online auction, group-buying and voting contexts. In the online auction context, PCD 100 users  
30 who are participating bidders may be notified fifteen minutes before the scheduled closing time of any auction. This notification increases the total participants in each auction, increases the number of final bids in the auction, and increases the final selling price as a result of increased buyer participation. In the online buying context, PCD 100 users who are group-buying participants of a currently available price may be notified fifteen minutes  
35 before the scheduled closing time of any group-buying opportunity. This notification increases the total participants in each group-buying opportunity, increases the number of actual buyers in each buying opportunity, and provides the lowest possible purchase price as



5 a result of increased buyer participation. In the voting context, PCD 100 users who need to cast votes by a certain time (e.g., board votes, partnership votes, etc.) benefit by having a reminder notification via PCD 100, or the opportunity to vote via PCD 100. In each of these three contexts, the PCD 100 user ultimately needs to conduct matters online, and the messaging system of the present invention serves the dual purpose of reminding the user of  
10 the impending matter while at the same time providing instant access to the Internet to take care of that matter.

FIG. 6 is a block diagram depicting an optional translation layer in messaging repository in accordance with the example embodiment of FIG. 2. If the content associated  
15 with inbound message 600 to messaging repository 200 is not in a format that can be stored by message server 203, and subsequently retrieved by recipient 260 (as outbound message 620), or if there is a possible need for multiple formats, optional translation layer 610 converts the original media into an electronic format suitable for storage in relational database 207. Relational database 207 can store (possibly converted) inbound messages 600  
20 in electronic format for presentation, most likely via a web server.

FIG. 7 is a block diagram depicting a portable computer device in accordance with an example embodiment of the present invention. PCD 100 in FIG. 7 resembles the Handspring VISOR (TM), which has external expansion slot 730 to allow third party  
25 developers to build hardware and software modules that extend the capabilities of the device. Existing VISOR (TM) modules include pager modules and wireless telephone modem modules. These modules allow PCDs 100 to be connected to traditional Internet service provider 220 networks. In this embodiment, communication device 160 is a module that connects to PCD 100 through expansion slot 730. Communication device 160 includes  
30 page 700, wireless modem 710, and firmware 720 (i.e., software that has been written onto read-only memory). Pager 700 includes a device with all of the normal attributes of a pager, except that the result of a page is not a beep or vibration of PCD 100, but rather an execution of the instructions stored in firmware 720. Wireless modem 710 includes a device with all of the normal attributes of a modem that uses a wireless mechanism to connect to  
35 other modems.

5           FIG. 8 is a flowchart of steps illustrating the operation of a portable computer device in accordance with the embodiment of FIG. 7. To begin (step 800), PCD 100 receives an incoming page including an Internet address and content type via pager 700. Firmware 720 receives the page, and determines if PCD 100 is in a reduced-power mode (step 820). Firmware 720 determines the power status of PCD 100 by communicating through its API  
10   (Application Program Interface). If PCD 100 indicates that it is in reduced-power mode via the API, then firmware 720 initiates a wake-up procedure, which causes PCD 100 to power-up to full operating capacity, through an operating system call (step 830). For the particular embodiment of the Handspring VISOR (TM), firmware 720 can manually assert and release the RESET\* signal after the module has been inserted by setting the hsCardAttrReset  
15   attribute of HsCardAttrSet(). This functionality is documented in the Development Kit for HandSpring Handheld Computers, Release 1.0, available from HandSpring, Inc., and herein expressly incorporated by reference.

Firmware 720 then launches the application software 150 appropriate for handling  
20   content of the type specified in the paged message (step 840). Application software 150 accesses the default Web server via wireless modem 710 and an auto-dialer, and resolves the Internet address received through pager 700 (step 850). When the content stored at the Internet address received by PCD 100 via wireless model 710, firmware 720 initiates an alert so that recipient 2609 becomes aware of the arrival of the pushed content (step 860).  
25   This alert can be in the form of, among other things, an audible indication or a pop-up display covering only a portion of input device 120 (e.g., display screen). This terminates the process (step 870).

Several embodiments of the present invention are specifically illustrated and/or  
30   described herein. However, it will be appreciated that modifications and variations of the present invention are covered by the above teachings and within the purview of the appended claims without departing from the spirit and intended scope of the present invention.

5    WHAT IS CLAIMED IS:

1.     A device for accessing content, comprising:  
         a communication device; and  
         a processor configured to receive via the communication device an address  
10     associated with content stored on a remote computer, the processor configured to  
         automatically, upon receiving the address, access via the communication device the  
         content using the received address without user intervention.
2.     The device according to claim 1,  
15           wherein the communication device includes a pager and a wireless modem;  
         wherein the processor is configured to receive by the pager the address via a  
         paging signal; and  
         wherein the processor is further configured to access the content via the  
         wireless modem.  
20
3.     The device according to claim 2, wherein the address is an Internet address.
4.     The device according to claim 2, wherein the address maps to an Internet address.
- 25    5.     The device according to claim 1, wherein the device includes a personal digital  
         assistant.
6.     The device according to claim 1, wherein the processor has a reduced-power mode,  
         the communication device configured to wake the processor from the reduced-power  
30     mode upon receiving the address.
7.     The device according to claim 1, wherein the address is an Internet address.
8.     The device according to claim 1, wherein the address maps to an Internet address.
- 35    9.     The device according to claim, further comprising:

- 5                   an Internet browser, the processor being configured to automatically access  
the content using the Internet browser.
10.   The device according to claim 1, wherein the content is an HTML page.
- 10   11.   A portable computing device, comprising:  
          a communication device; and  
          a processor, the processing receiving via the communication device an  
          address associated with content, the processor launching application software to  
          resolve the address.
- 15   12.   The portable computing device according to claim 11, wherein the address is one of  
an Internet address or a map to an Internet address.
13.   The portable computing device according to claim 11, wherein, if the device is in a  
20   reduced-power mode, the processor initiating a wake-up procedure in response to  
receiving the address.
14.   The portable computing device according to claim 11, wherein the content is an  
interactive message.
- 25   15.   The portable computing device according to claim 11, wherein the processor initiates  
an alert upon the resolution of the address.
16.   A communication device, comprising:  
30           a pager, the pager receiving an address associated with content;  
          a wireless modem; and  
          a storage device, the storage device storing instructions, the instructions  
          directing the launching of application software to resolve the address, the application  
          software accessing the Internet via the wireless modem.
- 35   17.   The communication device according to claim 16, wherein the instructions direct the  
initiation of a wake-up procedure in response to a reduced-power indication.

- 5
18. The communication device according to claim 16, wherein the instructions direct the initiation of an alert upon the resolution of the address.
19. A method for accessing content, comprising:
- 10       receiving at a processor an address associated with content stored on a remote computer; and
- upon receiving the address, automatically accessing the content via the processor using the received address, without user intervention.
- 15   20. The method according to claim 19, further comprising:
- receiving by a pager the address via a paging signal, the pager providing the address to the processor, wherein the processor accesses the content via a wireless modem.
- 20   21. The method according to claim 19, further comprising:
- upon receiving the paging signal, waking the processor from a reduced-power mode.
22. The method according to claim 19, wherein the address is an Internet address.
- 25   23. The method according to claim 19, wherein the automatically accessing step including automatically accessing the content using the received address, the received address mapping to an Internet address.
- 30   24. The method according to claim 19, wherein the processor resides in a personal digital assistant.
25. The method according to claim 19, wherein the automatically accessing step including automatically accessing the content using an Internet browser.
- 35   26. The method according to claim 19, wherein the content is an HTML page.

- 5 27. A method for receiving content into a portable computing device, comprising the steps of:
- (a) receiving a signal having an address associated with content; and
  - (b) launching application software to resolve the address.
- 10 28. The method according to claim 27, further comprising the step of:
- (c) initiating a wake-up procedure in response to a reduced-power indication.
29. The method according to claim 28, further comprising the step of:
- (d) initiating an alert based upon the resolution of the address.
- 15 30. A system for providing content, comprising:
- a communication device; and
  - a server system configured to transmit a remote device, via the communication device and a paging signal, an address associated with the content,
- 20 the server system further configured to provide the content to the remote device upon receiving a request from the remote device.
31. The system according to claim 30, wherein the server includes a plurality of servers, a first one of the servers configured to transmit the address to the remote device, and
- 25 a second one of the servers providing the content.
32. The system according to claim 30, wherein the server system includes a database, the database storing at least one delivery parameter, the server system being configured to transmit the address to the remote device using the at least one delivery parameter
- 30 stored in the database.
33. The system according to claim 30, wherein the server system is configured to transmit the address to the remote device in response to an event.
- 35 34. The system according to claim 33, wherein the event is a change in a stock price by more than a predetermined threshold amount.

- 5     35.     The system according to claim 33, wherein the event is an approaching closing time.
36.     The system according to claim 30, wherein the server system is coupled to the Internet, the server system receiving the request from the remote device via the Internet.
- 10     37.     A method for providing content, comprising:  
             transmitting a paging signal to a remote device, the paging signal including an address associated with the content;  
             receiving a request for the content from the remote device; and  
15             providing the requested content to the remote device.
38.     The method according to claim 37,  
             wherein the transmitted step is performed by a first server; and  
             wherein the providing step is performed by a second server.
- 20     39.     The method of claim 37, wherein the transmitting step includes using at least one delivery parameter, the delivery parameter being stored in a database.
40.     The method of claim 37, wherein the transmitting step is performed in response to an event.
- 25     41.     The method of claim 40, wherein the event is a change in a stock price by more than a predetermined threshold amount.
42.     The method of claim 40, wherein the event is an approaching closing time.
43.     The method of claim 37, wherein the receiving step includes receiving the request from the remote device via the Internet.
- 35     44.     A method for providing content to a portable computing device, comprising the steps of:  
             (a)     receiving the content intended for the portable computing device;

- 5           (b)     assigning an address to the content;  
            (c)     storing the content on a server at the assigned address; and  
            (d)     sending the address to the portable computing device, the portable computing  
                    device resolving the address to retrieve the content.
- 10    45.    The method according to claim 44, further comprising the step of:  
            (e)     converting the content into a format suitable for storage on the server.
46.    A method for providing content to a portable computing device, comprising the steps  
                    of:  
15           (a)     receiving an address associated with the content; and  
            (b)     sending the address to the portable computing device, the portable computing  
                    device resolving the address to retrieve the content.
47.    A computer-readable storage medium storing a set of instructions, the set of  
20           instructions capable of being executed by a processor to access content, the set of  
            instructions performing the steps of:  
            (a)     receiving at a processor an address associated with content stored on a  
                    remote computer; and  
            (b)     upon receiving the address, automatically accessing the content via the  
25           processor using the received address, without user intervention.
48.    A computer-readable storage medium storing a set of instructions, the set of  
            instructions capable of being executed by a processor to receive content into a  
            portable computing device, the set of instructions performing the steps of:  
30           (a)     receiving a signal having an address associated with content; and  
            (b)     launching application software to resolve the address.
49.    A computer-readable storage medium storing a set of instructions, the set of  
            instructions capable of being executed by a processor to provide content, the set of  
35           instructions performing the steps of:  
            (a)     transmitting a paging signal to a remote device, the paging signal including  
                    an address associated with the content;



- 5           (b)     receiving a request for the content from the remote device; and  
          (c)     providing the requested content to the remote device.
50.     A computer-readable storage medium storing a set of instructions, the set of  
instructions capable of being executed by a processor to provide content to a portable  
10     computing device, the set of instructions performing the steps of:  
          (a)     receiving the content intended for the portable computing device;  
          (b)     assigning an address to the content;  
          (c)     storing the content on a server at the assigned address; and  
          (d)     sending the address to the portable computing device, the portable computing  
15     device resolving the address to retrieve the content.
51.     A computer-readable storage medium storing a set of instructions, the set of  
instructions capable of being executed by a processor to provide content to a portable  
computing device, the set of instructions performing the steps of:  
20     (a)     receiving an address associated with the content; and  
          (b)     sending the address to the portable computing device, the portable computing  
device resolving the address to retrieve the content.

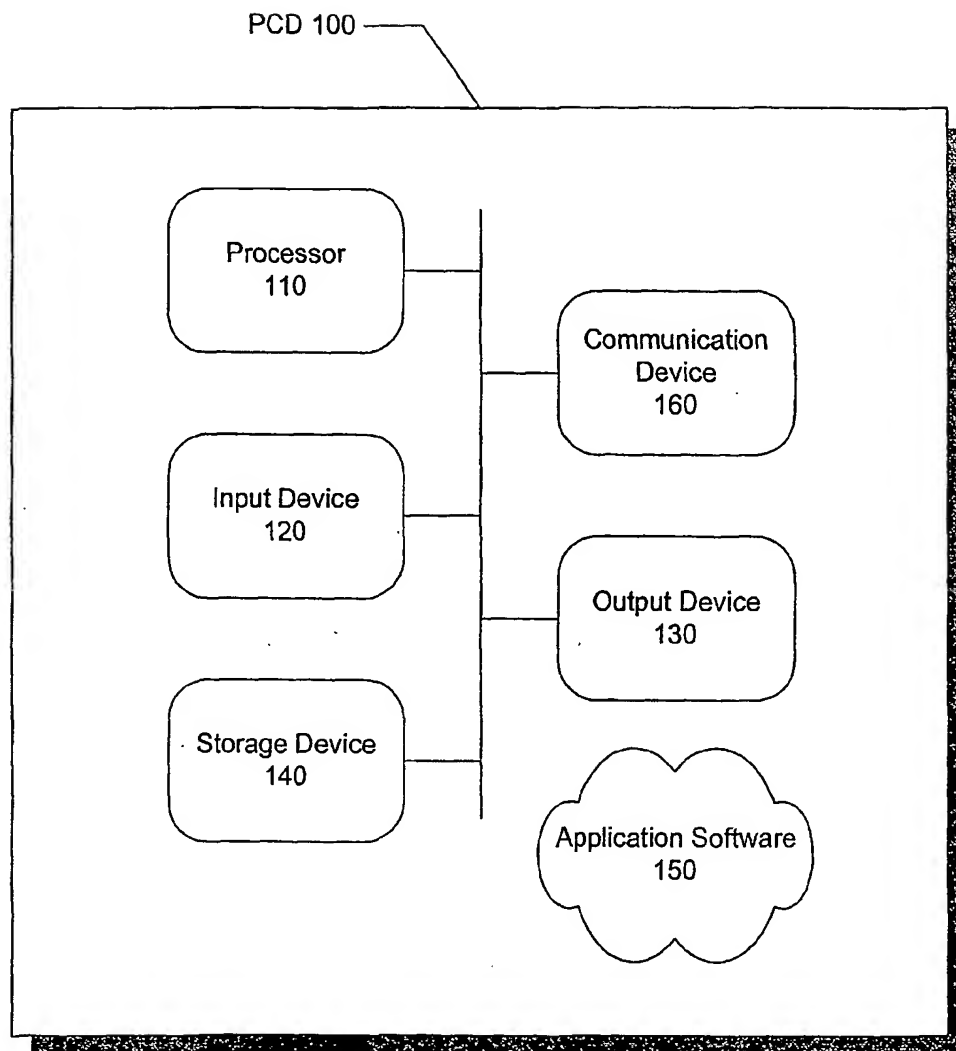


FIG. 1

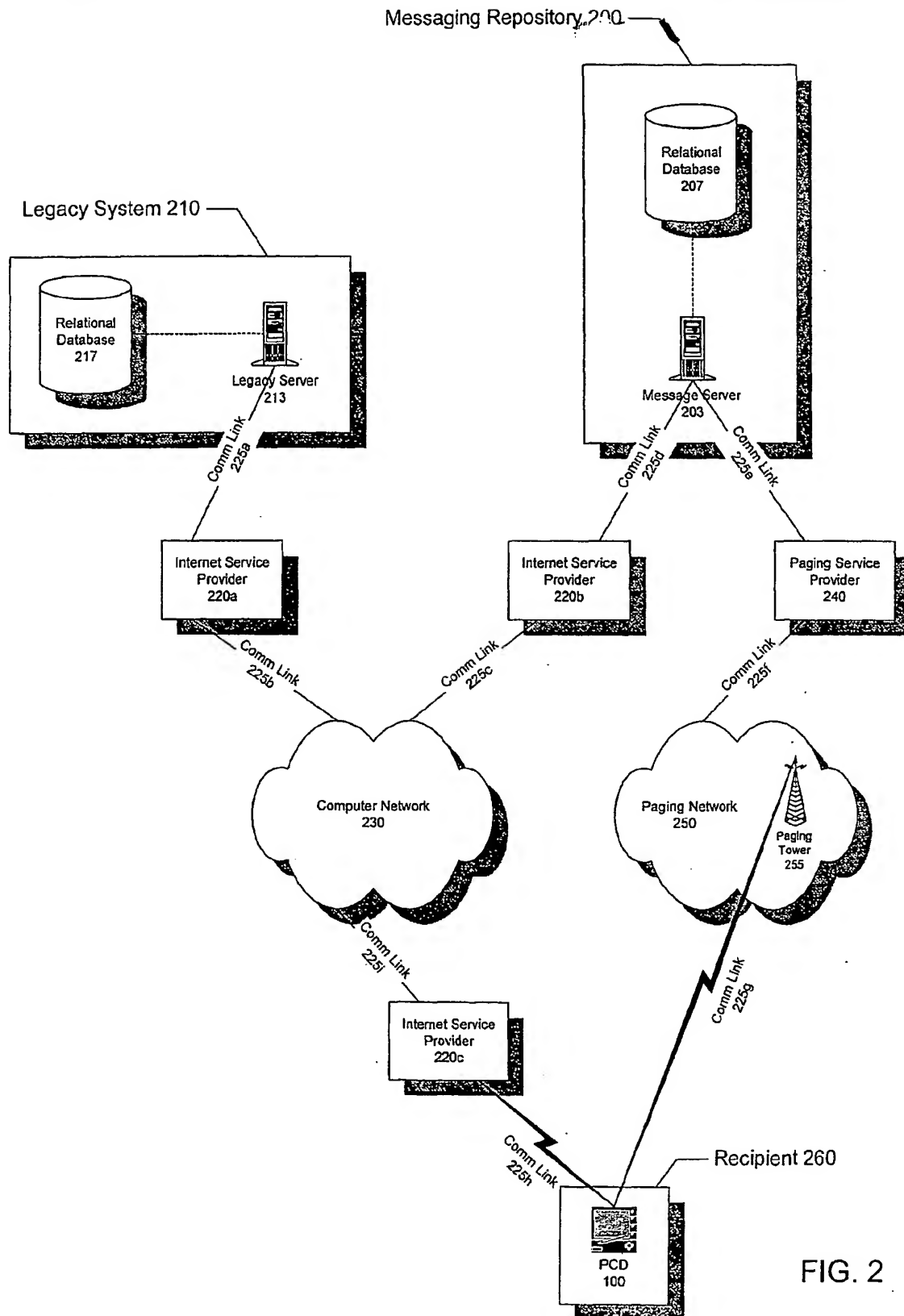


FIG. 2

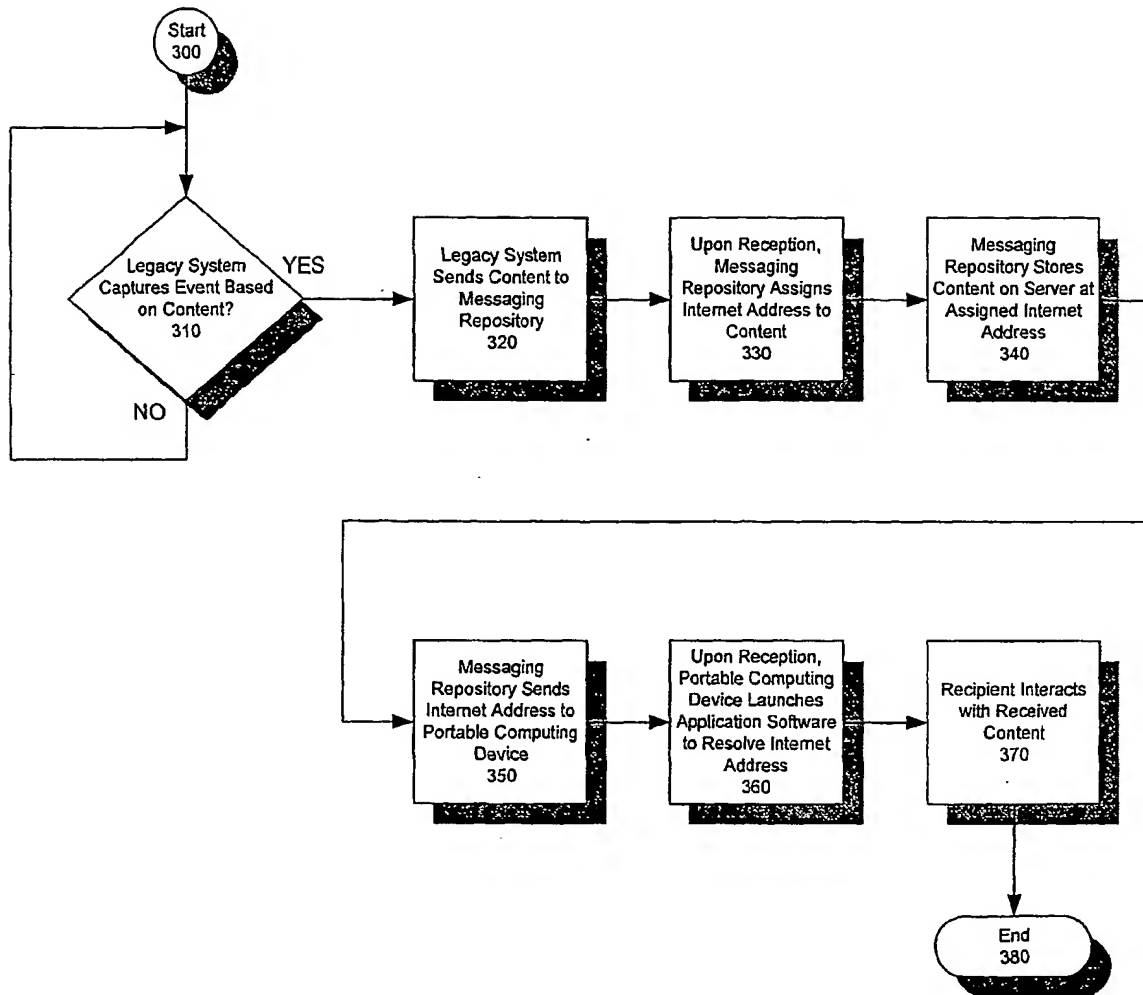


FIG. 3

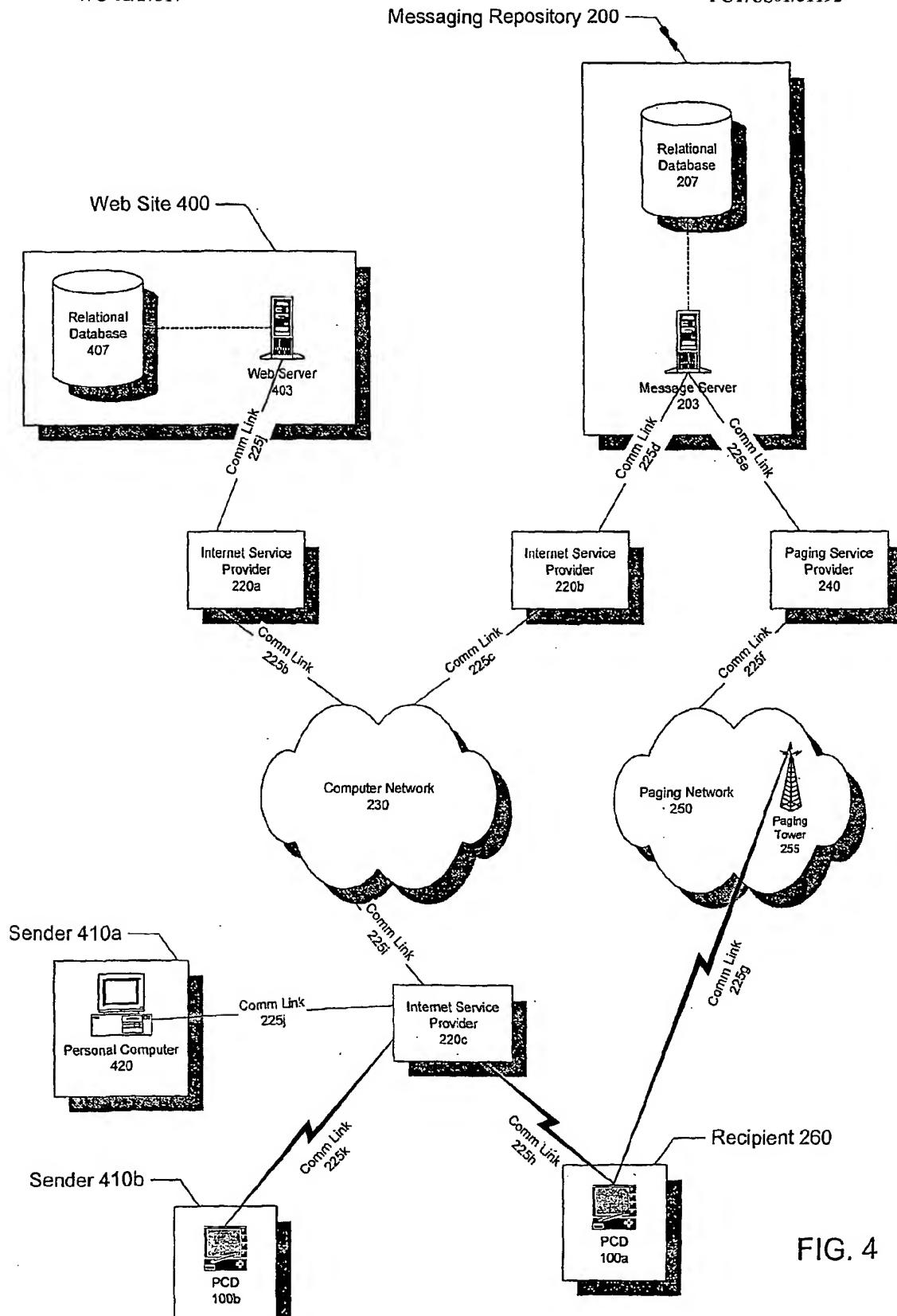


FIG. 4

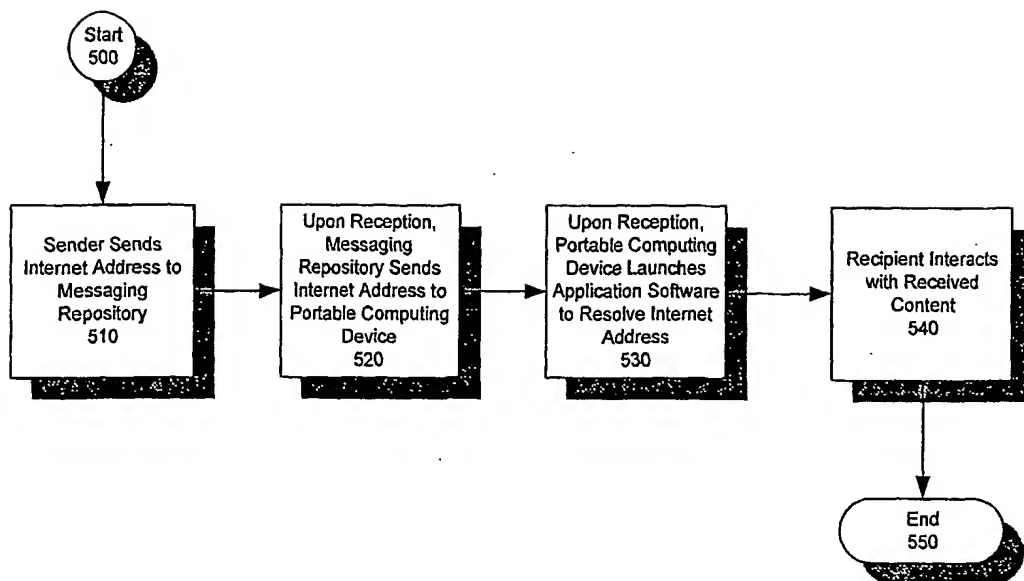


FIG. 5

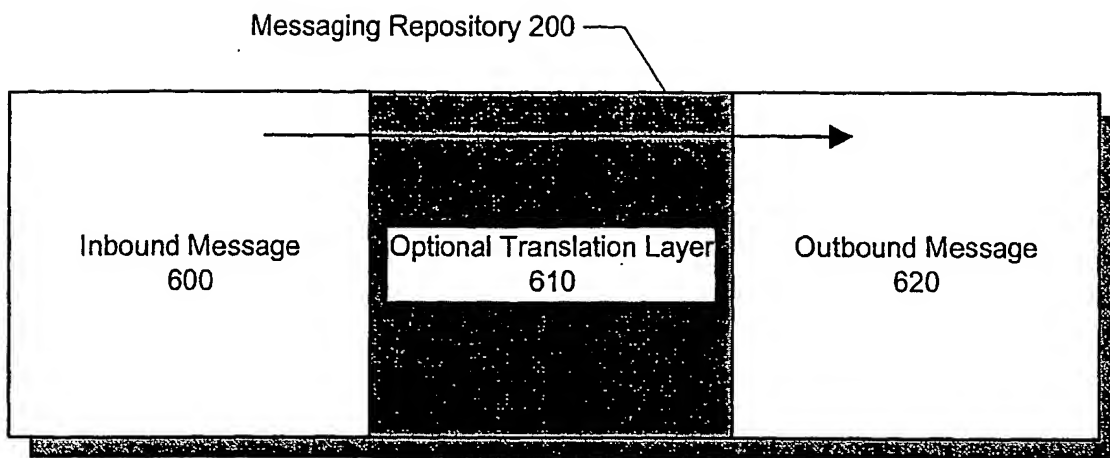


FIG. 6

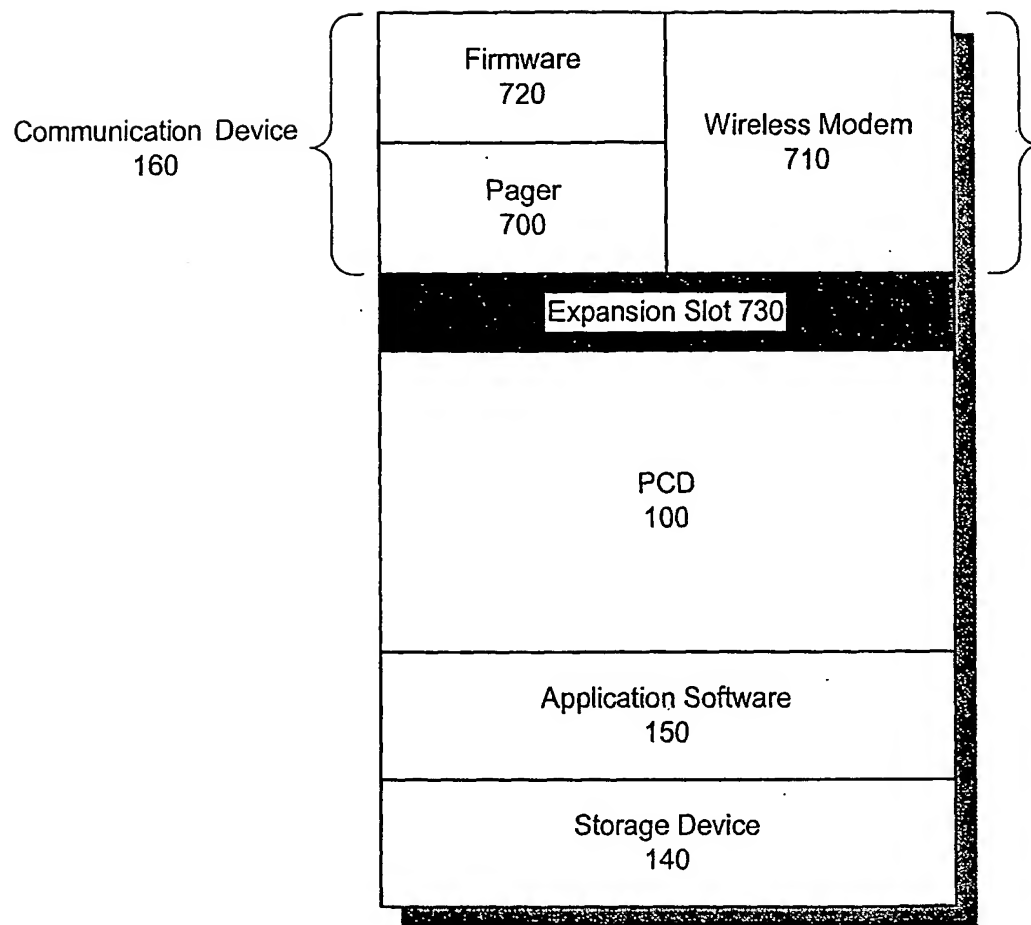


FIG. 7



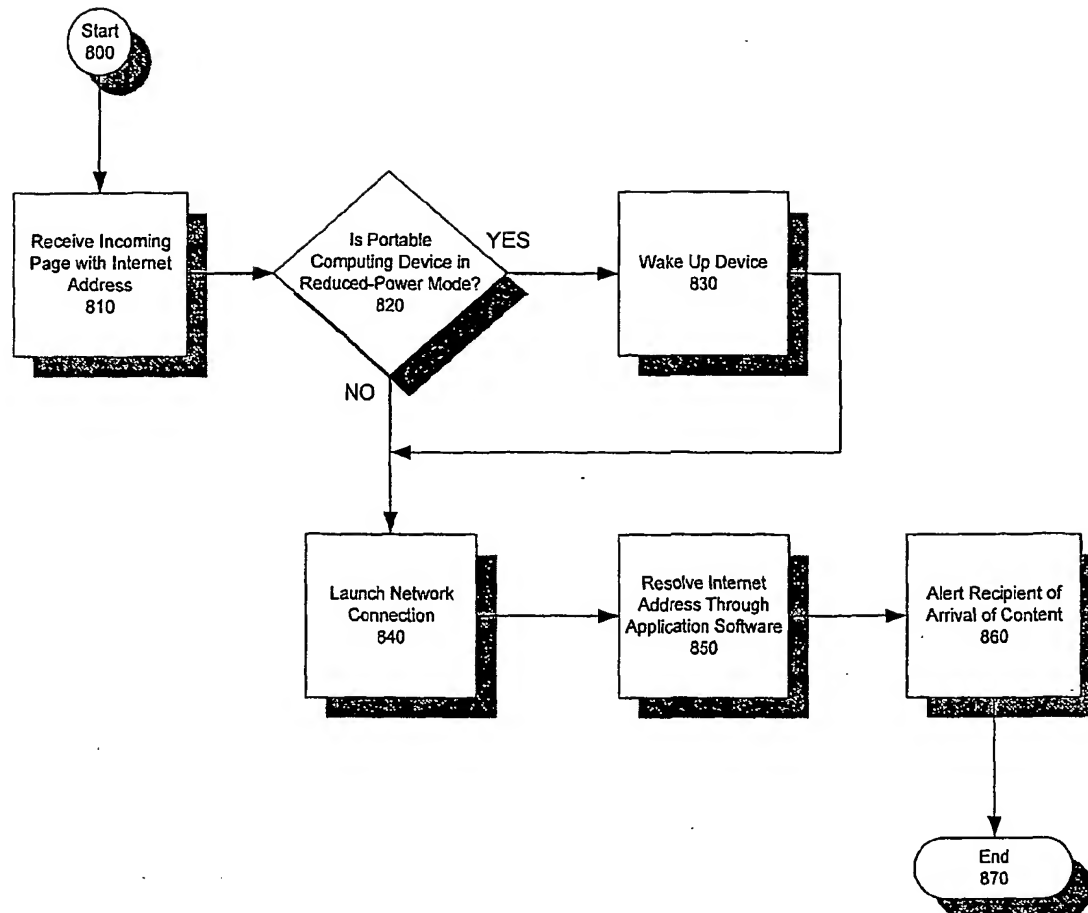


FIG. 8

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/31192

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC(7) : G06F 15/16		
US CL : 709/ 202, 203, 207, 227		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
U.S. : 709/ 202, 203, 207, 227		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
WEST		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,942,986 A (SHABOT et al) 24 August 1999 (24.08.1999), column 2, line 27 to column 4, line 6.	1-51
Y	US 5,745,689 A (YEAGER et al) 28 April 1998 (28.04.1998), column 1, line 55 to column 2, line 60.	1-51
Y,P	US 2001/0005864 A1 (MOUSSEAU et al) 28 June 2001 (28.06.2001), abstract, [0013] to [0021].	1-51
Y,P	US 2001/0015977 A1 (JOHANSSON) 23 August 2001 (23.08.2001), abstract, [0017] to [0031].	1-51
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents:		
"A"	document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O"	document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed	
Date of the actual completion of the international search		Date of mailing of the international search report
04 December 2001 (04.12.2001)		27 DEC 2001
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230		Authorized officer Meng-Ai T An <i>Meng-Ai T An</i> Telephone No. (703) 305-3900